14 GRAND CHALLENGES FOR ENGINEERING IN THE 21ST CENTURY

GRAND CHALLENGE SCHOLARS PROGRAM

Key Components

Research Experience | Interdisciplinary Curriculum | Entrepreneurship
Global Dimension | Service Learning

uidaho.edu/grandchallenges

The University of Idaho, College of Engineering is committed to developing a long-term program designed to prepare a minimum of 20 students annually to lead the way in meeting challenges identified by the National Academy of Engineering that are key to maintaining and improving quality of life across the globe.

Themes and Challenges

SUSTAINABILITY

1. Make solar energy economical
2. Provide energy from fusion
3. Develop carbon sequestration methods
4. Manage the nitrogen cycle
5. Provide access to clean water

SECURITY

6. Restore and improve urban infrastructure
7. Prevent nuclear terror
8. Secure cyberspace

HEALTH

9. Advance health informatics
10. Engineer better medicines

JOY OF LIVING

11. Reverse-engineer the brain
12. Enhance virtual reality
13. Advance personalized learning
14. Engineer the tools of scientific discovery

CORPORATE SUPPORTERS

AVISTA Corp. | Micron Foundation | IDAHO POWER

In a letter of commitment presented to President Barack Obama the University of Idaho joined 122 U.S. engineering schools to announce plans to educate a new generation of engineers expressly equipped to tackle some of the most pressing issues facing society i n the 21st century.

Prevent Nuclear Terror

Long before 2001, defenders of national security worried about the possible immediate death of 300,000 people and the loss of thousands of square miles of land to productive use through an act of terror.

Provide Access to Clean Water

Today, the availability of water for drinking and other uses is a critical problem in many areas of the world.

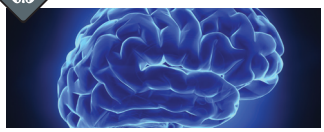
Advance Health Informatics

When you dial 911 for a medical emergency, the outcome may very well depend on the 411 — the quality of the information available about your condition and ways to treat it.

Engineer the Tools of Scientific Discovery

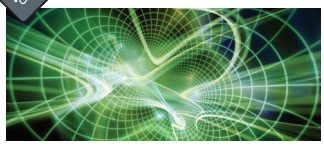
In the popular mind, scientists and engineers have distinct job descriptions. Scientists explore, experiment, and discover; engineers create, design, and build.

Reverse Engineer the Brain



For decades, some of engineering's best minds have focused their thinking skills on how to create thinking machines — computers capable of emulating human intelligence.

Energy from Fusion



If you have a laptop computer, its battery probably contains the metallic element lithium. In theory, the lithium in that battery could supply your household electricity needs for 15 years.

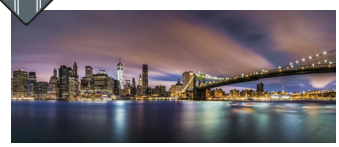
Manage the Nitrogen Cycle

It doesn't offer as catchy a label as "global warming," but human-induced changes in the global nitrogen cycle pose engineering challenges just as critical as coping with the environmental consequences of burning fossil fuels for energy.

Secure Cyberspace

Personal privacy and national security in the 21st century both depend on protecting a set of systems that didn't even exist until late in the 20th — the electronic web of information-sharing known as cyberspace.

Restore and Improve Urban Infrastructure



In 2005, the American Society of Civil Engineers issued a report card, grading various categories of U.S. infrastructure. The average grade was D (Updated to D+ in 2013).

Engineer Better Medicines

Doctors have long known that people differ in susceptibility to disease and response to medicines. But, with little guidance for understanding and adjusting to individual differences, treatments have been standardized rather than individualized.

Enhance Virtual Reality

To most people, virtual reality consists mainly of clever illusions for enhancing computer video games or thickening the plot of science fiction films.

Advanced Personalized Learning

For years, researchers have debated whether phonics or whole-word recognition is the best way to teach children how to read. Various experts can be found who will advocate one approach or the other.

Make Solar Energy Economical

As a source of energy, nothing matches the sun. Only a small fraction of the sun's power output strikes the Earth, but even that provides 10,000 times as much as all the commercial energy that humans use on the planet.

Develop Carbon Sequestration Methods

The growth in emissions of carbon dioxide, implicated as a prime contributor to global warming, is a problem that can no longer be swept under the rug. But perhaps it can be buried deep underground or beneath the ocean.

NAE GRAND CHALLENGES FOR ENGINEERING
NATIONAL ACADEMY OF ENGINEERING

University of Idaho
College of Engineering